Federal Democratic Republic of Ethiopia

☞ EDICT OF GOVERNMENT ☜

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ET 491 (2000) (English): SAND USED FOF GERMINATION TEST - DETERMIATION OF SPECIFIC CONDUCTANCE

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(Reaffirmed :2012)

First edition

Sand used for germination test – Determination of specific conductance

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Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for seeds (TC 16) and published by the Ethiopian Standards Agency (ESA).
The technical contents in the text of this Standard are identical with ES 491:2000 edition while the reissued standard carries some editorial and technical changes observed in the course of systematic review.

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Sand used for germination test — Determination of specific conductance

1 Scope

This Ethiopian Standard specifies the method for determining specific conductance of sand used for germination test.

2 Apparatus

2.1 The following apparatus showing its essential features shall be used :-

a) Conductivity cell (x);

b) Electrode; and

c) Ear phone (E,T).

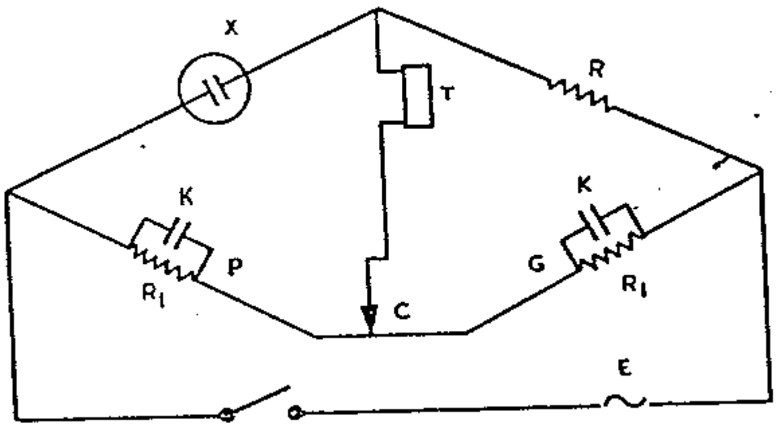

FIG. 1 ASSEMBLY OF APPARATUS FOR MEASURING SPECIFIC CONDUCTIVITY

2.2 In the above figure X, represents conductivity cell with two electrodes immersed in solution connected in one arm of the Whetstone bridge circuit. The adjacent arm has a variable resistance R. The other two arms of the bridge consists of a wire PG of uniform resistance of 1000 cm length, with a sliding contact C which provides a variable ratio of the two sections of the wire PG. The source of alternating current for the bridge circuit is E, T being earphone to determine when the bridge is in balance.

2.3 In making a measurement, the contact C is moved along the wire until there is a minimum sound or no sound is in the earphone. Since the sliding wire PG is of uniform resistance, the resistance of the section of either side of the sliding contact C is proportional to its length.

2.4 Since it is desirable to have more resistance in the ratio arms PG and CG, than is provided by the slide wire PG alone, the effective resistance is increased by the introduction of resistance coils R1 in series with each section of the slide wire with a switch K to short circuit the coil, when necessary. Usually, the resistance of each coil is exactly 4.5 times that of the wire, which means that the resistance of the slide wire alone, becomes one tenth of the total ratio arm (inclusive of the resistance coils).

2.5 Normally, the bridge is first balanced with the switches K closed on, by adjusting the contact C. This gives and approximates idea of the resistance of the solution in the conductivity cell. The resistance R is then set as closely as possible to the value thus measured, and the final balance of the bridge is obtained by adjusting with the contact C with switches K.

3 Reagent

During the analysis, use only the following reagents of recognized analytical reagent grade and distilled water.

3.1 Chromic acid solution

3.2 Conductivity water, of specific conductivity not more than 3.0kg/cm^3.

3.3 Potassium chloride solution, 0.0N accurately prepared.

3.4 Chloroplatinic chloride solution, 3 g of chloroplatinic acid and 0.02 to 0.03 g of lead acetate shall be dissolved in 100 ml of water.

4 Procedure

4.1 Platinizing the Electrodes of the conductivity cell.

Wash the electrodes of the conductivity cell first with warm chromic acids solution and then several times with distilled water. Support the electrode in an inclined position in the Chloroplatinic acid solution and connect by way of a commentator to a 4-volt lead accumulator and rheostat. Adjust the current so that evolution of gas is slow. Reverse the current every 30 seconds. Thus continue to pass the current for 15 minutes. Disconnect the conductivity cell it wash with distilled water thoroughly and fill with dilute sulphuric acid electors the solution of sulphuric acid for half an hour to remove occluded gases, reversing the current every 30 seconds. Wash the cell with conductivity water.

4.2 Determination of the cell constant

4.2.1 Wash the conductivity cell with the conductivity water. Then rinse with potassium chloride solution. Add a sufficient quantity of potassium chloride solution so that the electrodes are well within the solution, taking care that no air bubbles are enclosed between the electrodes. Place the conductivity cell on a tripled stand in a thermostat. Regulate thermostat so that the temperature is set at 35.0 ± 1^{0}C. Ensure that all the connections are made with fairly thick copper wire (if necessary, the ends of the wires scraped with a knife). When the solution has attained the temperature of the bath, the resistance of the solution by inserting a known resistance in the box, and determining the minimum sound position on the bridge wires. Regulate the resistance so that the readings lie on the middle third of the bridge. Determine the minimum sound position on the bridge wire with four different resistances. Replace with another portion of the potassium chloride solution determines the minimum sound position with four different resistances again. Calculate the cell constant from each determination by the given in clause 4.1 herein and take the mean of all values as the cell constant.

4.2.2 Taking a suitable quantity of sand in the conductivity cell and moisten to its 50 percent water holding capacity determined the minimum sound position at 35^{0}C as in clause 3.2.1 herein. Repeat the experiment with four different resistances and also with another portion of the test solution in the same manner with four different resistances. Note the bridge readings for the minimum sound position in each case and the conductivity calculated as given in clause 4.3 herein.

4.2.3 Determine the specific conductivity of the conductivity of water at 35 ^{o}C in the same manner, repeating experiment with another portion of the conductivity water. Note the eight readings. The specific conductivity of the conductivity water is calculated as given in clause 4.2.

5 Expression of result

5.1 Cell constant**,**

$$K \frac{CAR}{1000 - A}$$

Where

K *is the cell constant,*

C *is the specific conductivity at 350C of potassium chloride solution that is 3.312 ms/cm3,*

A *is a bridge wire reading, and*

R *is a known resistance inserted.*

5.2 Specific conductivity (MS/cm/3) of conductivity water at conductivity of water at

35^{0}C =

$$\frac{(1000 - A_1)Kx106}{A_1R_1}$$

Where,

A1 *is a bridge wire reading,*

K *is calculated average cell constant, and*

R1 *is a known resistance inserted.*

5.3 The average of eight readings moistened sand at 35^{0}C = $\frac{(1000 - A2)K \text{ x } 106 - X}{A2R2}$

Where,

A2 *is a bridge wire reading obtained in the experiment with the test solution,*

K *is calculate average cell constant,*

R2 *is a known resistance inserted for the experiment with the test solution, and*

X` *is the average specific conductivity (MS/cm3) of the conductivity water at 350C.*

6 Test report

The test report shall include the following information:

a) A reference to the Ethiopian Standard;

b) The results and method of expression used;

c) All information necessary for completing the test;

d) Any unusual feature noted during the determination; and

e) Any operation not included in the Ethiopian Standard or in the Ethiopian Standard to which reference is made, or regarded as optional.

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Ethiopian Standards Agency

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010.ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1970.

ESA's objectives are:-

- Develop Ethiopian standards and establish a system that enable to check weather goods and services are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational Institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.
Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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